

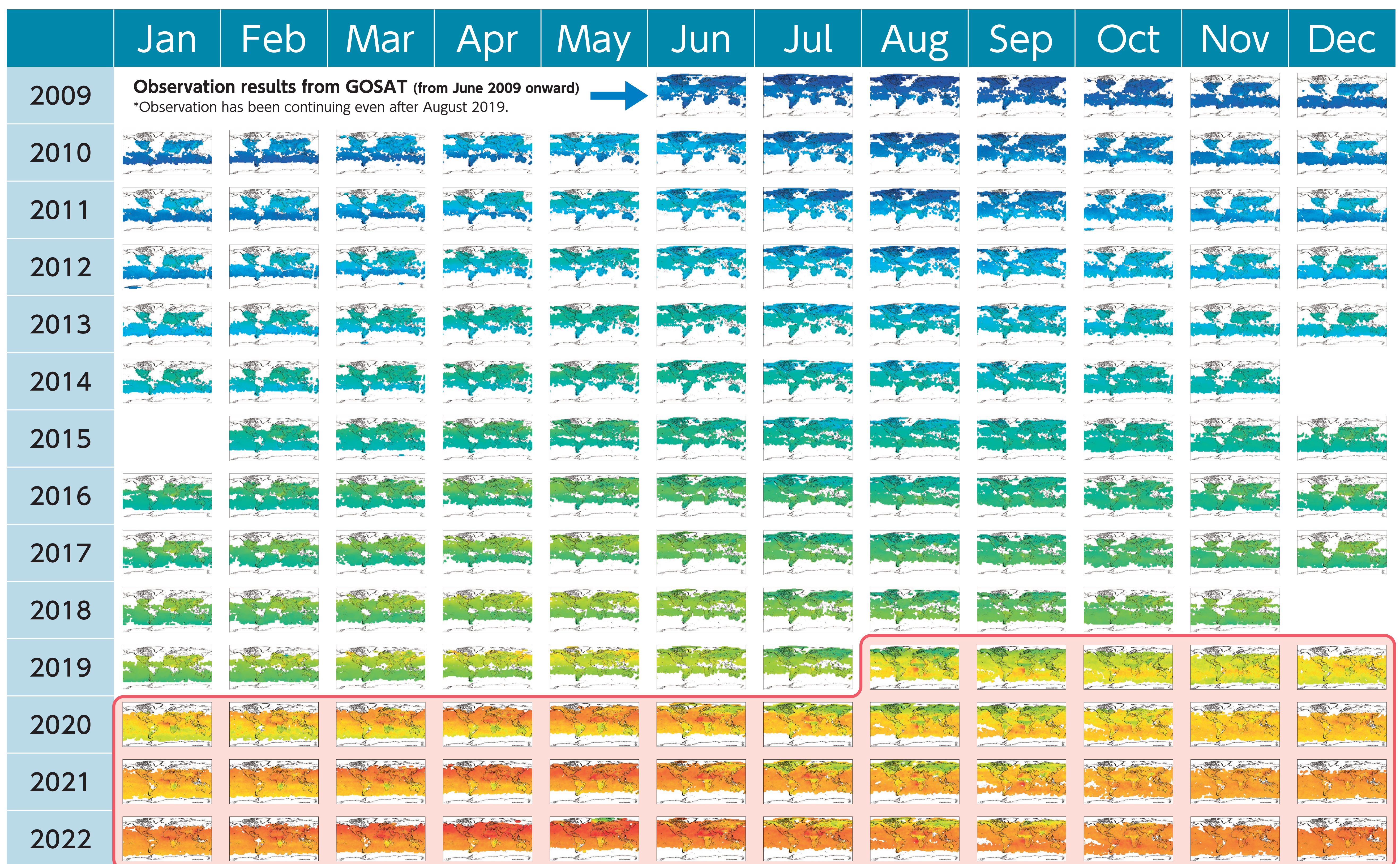
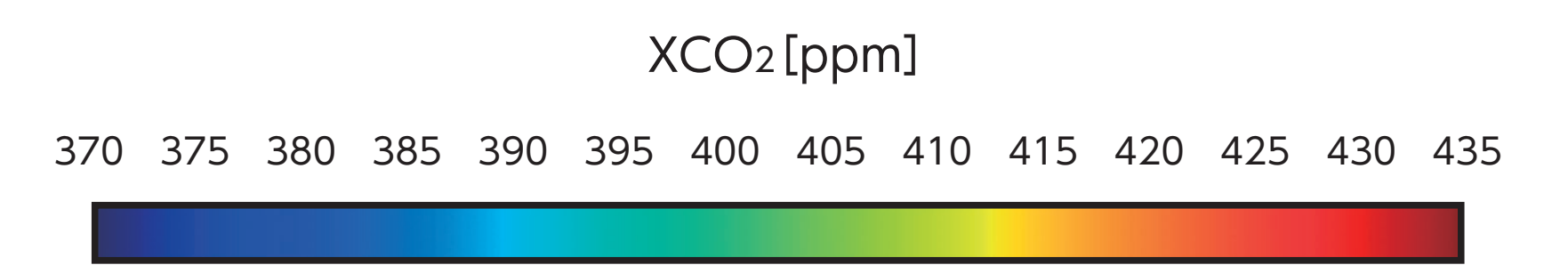


# Observing carbon dioxide with GOSAT Series

The GOSAT Series consists of the earth-observing satellites GOSAT, GOSAT-2, and GOSAT-GW, which observe greenhouse gases such as carbon dioxide and methane. The GOSAT Series is a project that is jointly promoted by the three entities: the Ministry of the Environment (MOE), the National Institute for Environmental Studies (NIES), and the Japan Aerospace Exploration Agency (JAXA).

## Observation of carbon dioxide (CO<sub>2</sub>) with GOSAT Series

The following are monthly averages of “CO<sub>2</sub> concentrations from the ground up to approximately 70 km in the sky” (XCO<sub>2</sub> concentrations) that have been observed with the GOSAT Series. The GOSAT Series ascertains CO<sub>2</sub> concentrations by observing sunlight reflected off of the surface of the ground. Even though there are some regions where observation is difficult, such as cloudy areas, and polar areas with low solar elevation, the GOSAT Series is able to comprehensively observe the entire earth.



**Observation results from GOSAT-2 (from August 2019 onward)**  
 Although simple comparisons cannot be made since the data from both GOSAT and GOSAT-2 have not yet been corrected for errors and so on, there appears to be a trend in which concentrations have been rising in recent years.

GOSAT-2 observes the entire earth in even greater detail than GOSAT, over a period of six days. Moreover, it appears to have a higher quantity of valid observation data than GOSAT. This is due the fact that it has been equipped with improved sensor functions, and functions for observing while automatically avoiding clouds, which hinder observation.

## Global Observing SATellite for Greenhouse gases and Water cycle (GOSAT-GW)

GOSAT-GW, the third satellite in the Series after GOSAT and GOSAT-2, is scheduled to be launched. The GOSAT Series is aimed at helping with the development of climate change-related science, and contributing to climate-change policies.

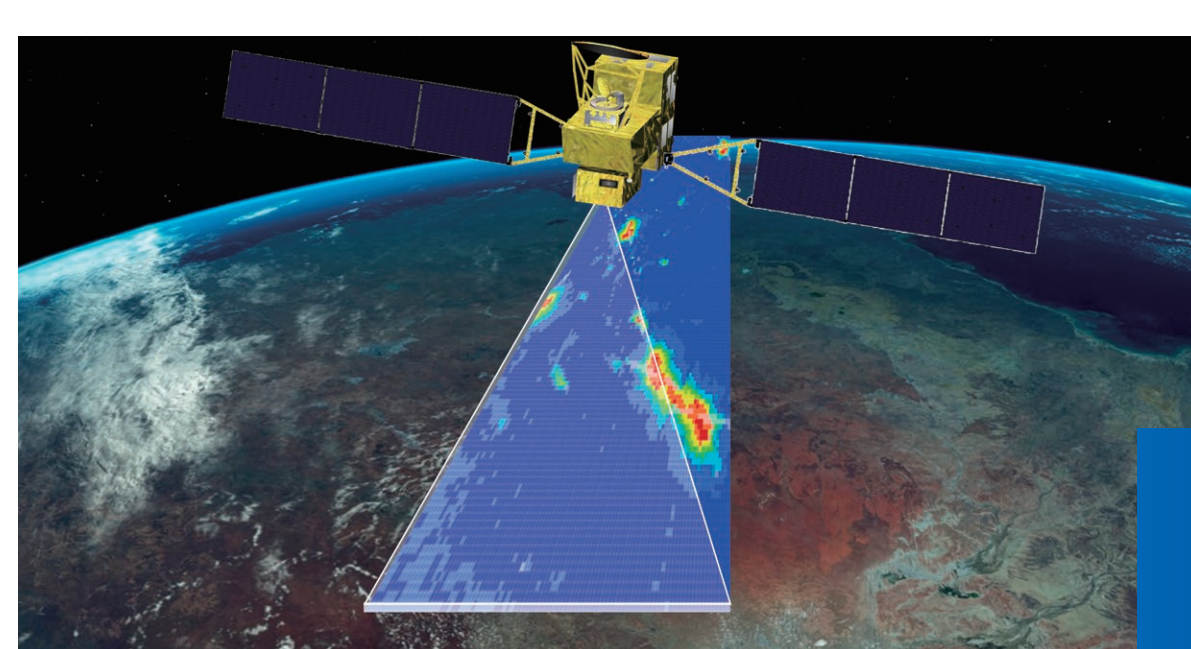
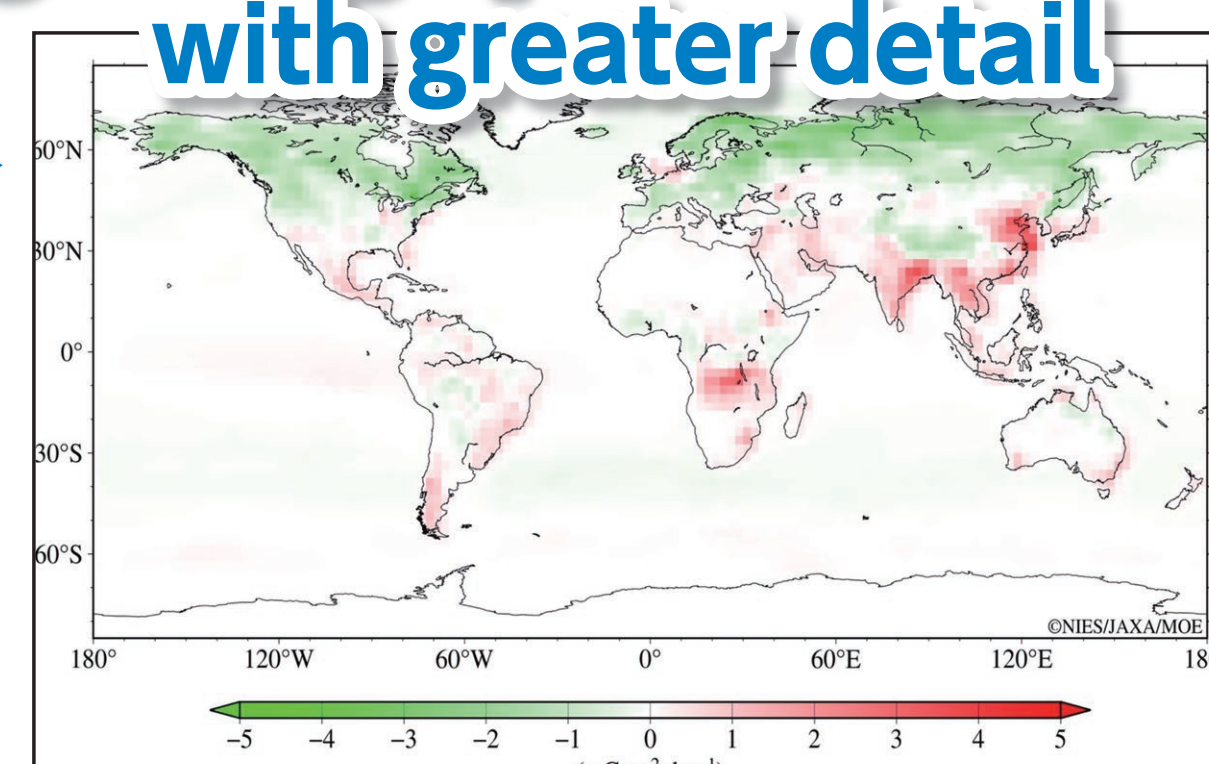


Illustration of Wide Mode

In Wide Mode, a 911 km-wide area is observed all at once, so there is 100 to 1,000 times more data than before.

**Aiming for high-precision observation  
with greater detail**



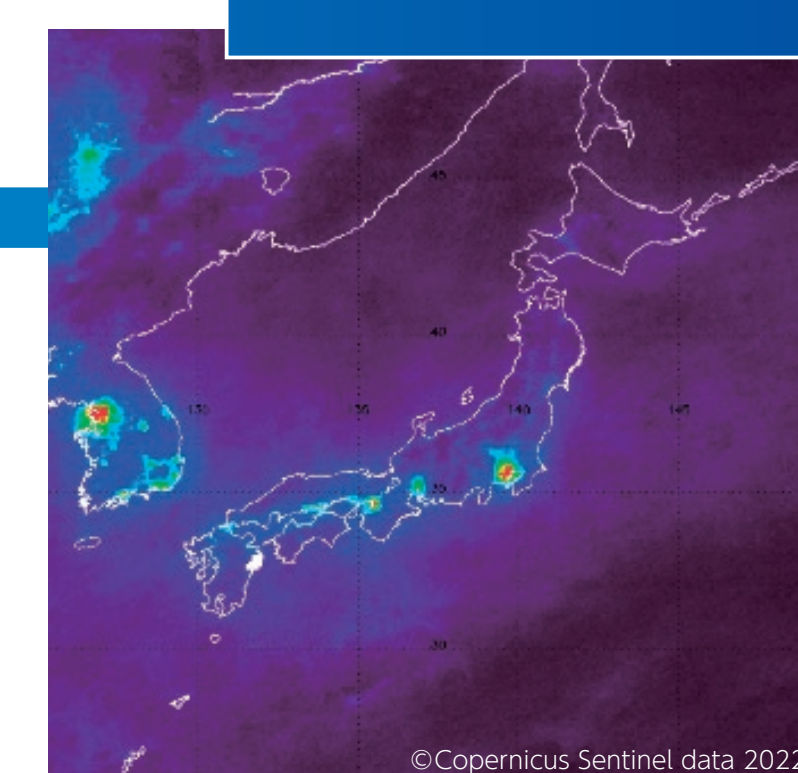
Absorption & emission volumes estimated using GOSAT-GW data (illustration)



Illustration of Focus Mode

Focus Mode has a high resolution of 3 km (target resolution of 1 km), so large-scale emission sources can be captured in detail.

Observation of NO<sub>2</sub> with European satellites  
 GOSAT-GW will simultaneously observe CO<sub>2</sub>.



Through the simultaneous observation of CO<sub>2</sub> and nitrogen dioxide (NO<sub>2</sub>), human-induced CO<sub>2</sub> emission sources can be identified, and emissions can be accurately estimated.



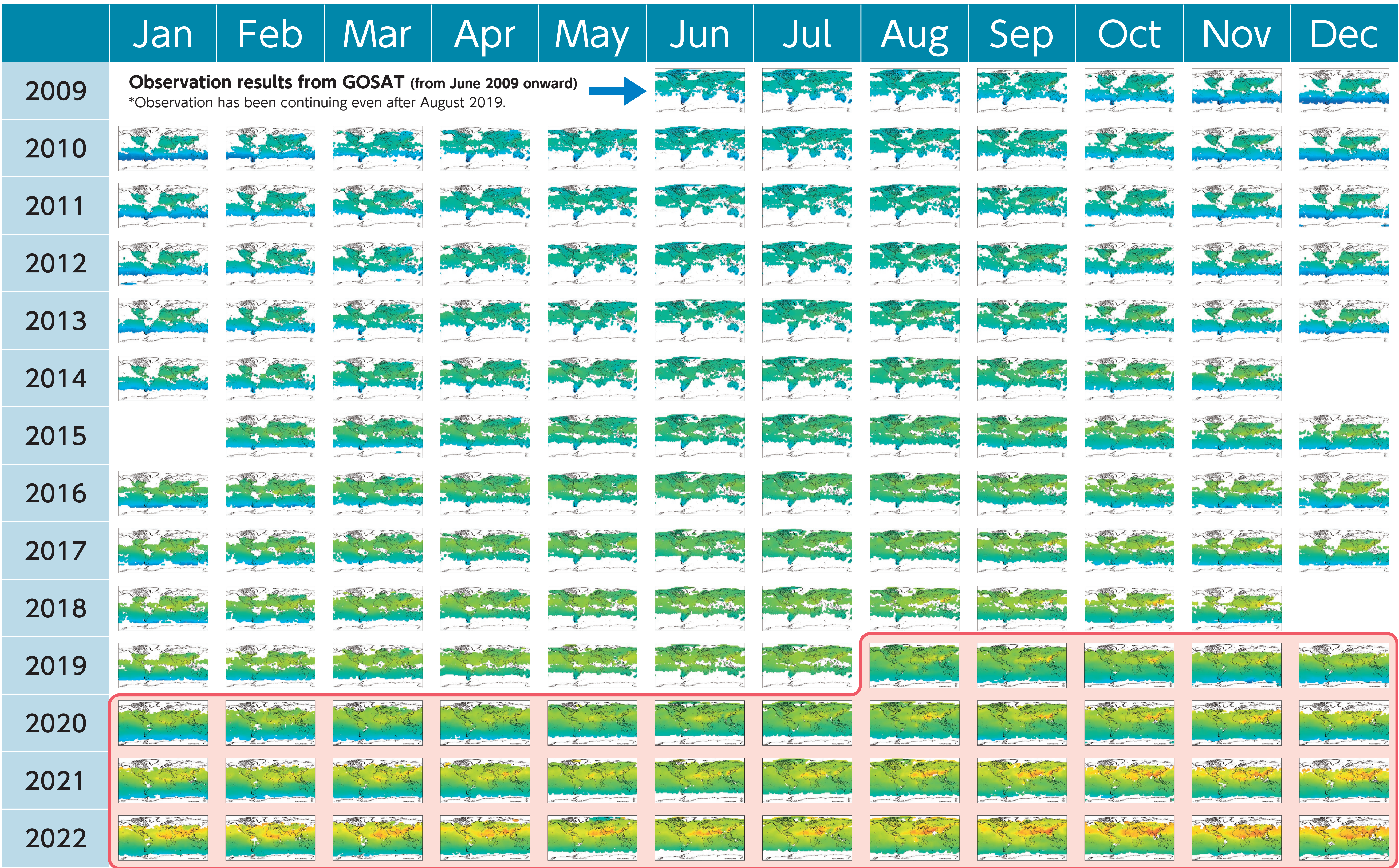
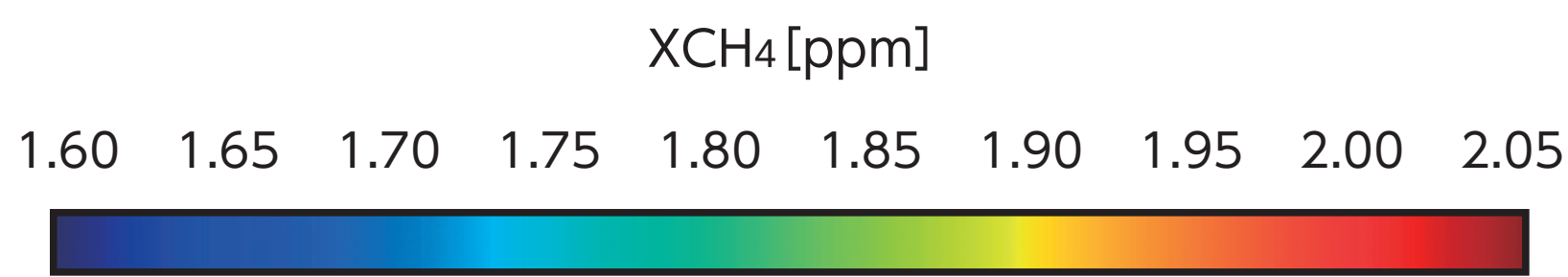


# Observing methane with GOSAT Series

The GOSAT Series consists of the earth-observing satellites GOSAT, GOSAT-2, and GOSAT-GW, which observe the greenhouse gases such as carbon dioxide and methane. The GOSAT Series is a project that is jointly promoted by the three entities: the Ministry of the Environment (MOE), the National Institute for Environmental Studies (NIES), and the Japan Aerospace Exploration Agency (JAXA).

## Observation of methane (CH<sub>4</sub>) with GOSAT Series

The following are monthly averages of “CH<sub>4</sub> concentrations from the ground up to approximately 70 km in the sky” (XCH<sub>4</sub> concentrations) that have been observed with the GOSAT Series. The GOSAT Series ascertains CH<sub>4</sub> concentrations by observing sunlight reflected off of the surface of the ground. Even though there are some regions where observation is difficult, such as cloudy areas, and polar areas with low solar elevation, the GOSAT Series is able to comprehensively observe the entire earth.



Observation results from GOSAT-2 (from August 2019 onward)

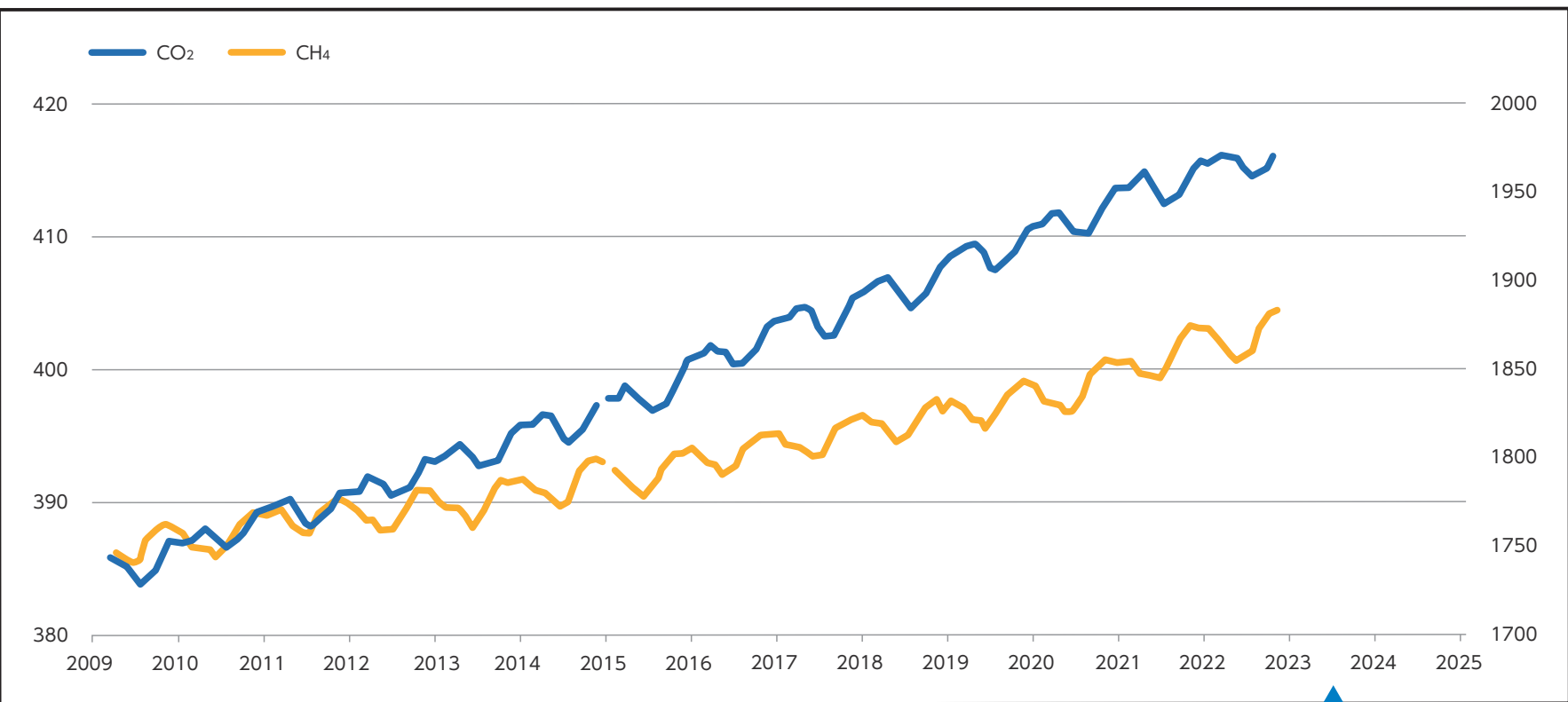
GOSAT-2 observes the entire earth in even greater detail than GOSAT, over a period of six days. Moreover, it appears to have a higher quantity of valid observation data than GOSAT. This is due the fact that it has been equipped with improved sensor functions, and functions for observing while automatically avoiding clouds, which hinder observation.

## Aims of GOSAT-GW

GOSAT-GW, the third satellite in the Series after GOSAT and GOSAT-2, is scheduled to be launched. GOSAT-GW will implement the following missions.

### Monitoring of greenhouse gases

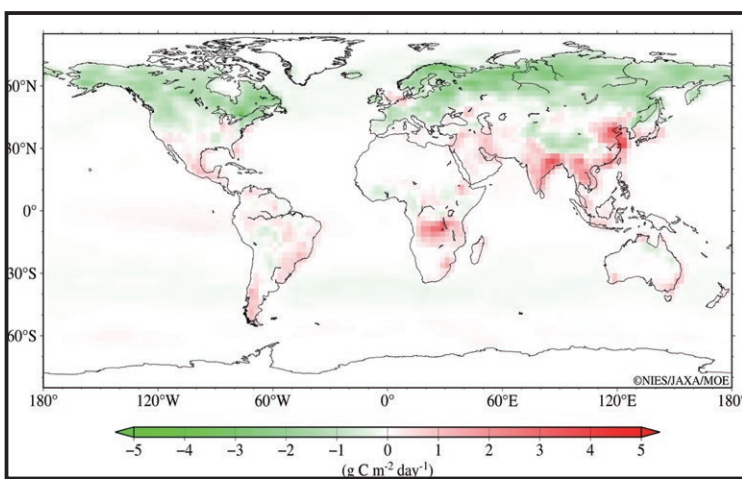
Like GOSAT and GOSAT-2, GOSAT-GW will monitor fluctuations in concentrations of greenhouse gases.



What will concentrations of greenhouse gases be in the future?

### Verifying human-induced greenhouse gas emissions by country

GOSAT-GW will aim to improve accuracy, transparency, and reliability regarding the CO<sub>2</sub> and CH<sub>4</sub> emissions that countries announce based on the Paris Agreement.



Absorption & emission volumes estimated using GOSAT-GW data (illustration)

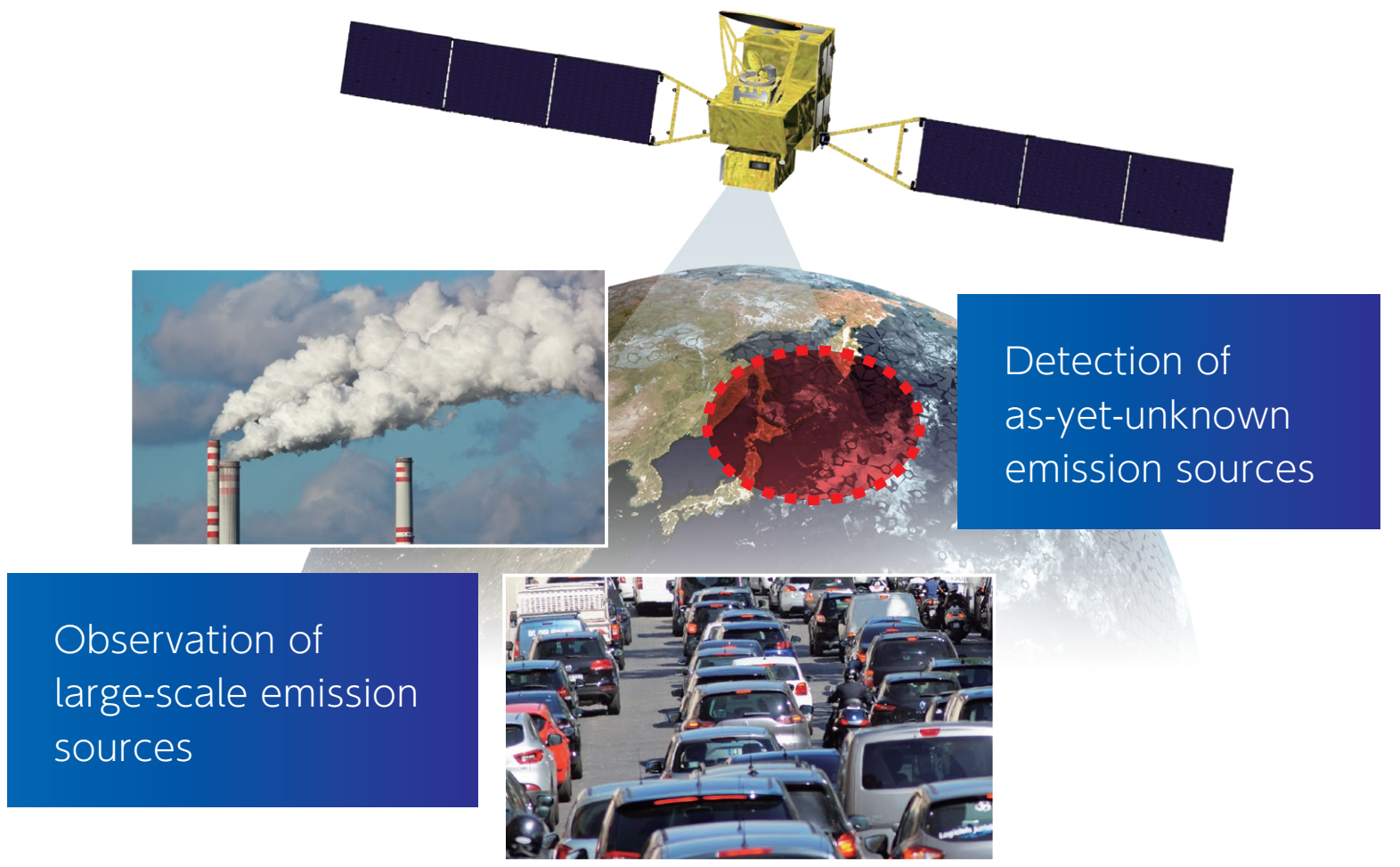
Comparative verification will be carried out with the aim of improving the reliability of emission reports.



Emission reports of countries

### Detecting large-scale emission sources, etc.

GOSAT-GW will aim to achieve a high level of accuracy for estimations of emissions from large-scale emission sources, and detect as-yet-unknown emission sources.



The GOSAT Series will help improve the reliability and transparency of climate-change policies that countries implement based on the Paris Agreement, and contribute to the development of climate-change science.